

American Spongeplant (*Limnobium spongia*)

Ecological Risk Screening Summary

U.S. Fish & Wildlife Service, March 2021

Revised, April 2021

Web Version, 7/30/2021

Organism Type: Plant

Overall Risk Assessment Category: Uncertain



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1 Native Range and Status in the United States

Native Range

From Madsen et al. (1998):

“American frogbit (*Limnobium spongia* (Bosc) Steudel) is a native aquatic monocot found in the southern United States through Texas and up the eastern, coastal states to New Jersey (Gleason and Cronquist 1991).”

According to USDA (2021), *Limnobium spongia* has a native range that includes the following States: Texas, Louisiana, Oklahoma, Arkansas, Missouri, Illinois, Indiana, Kentucky, Tennessee, Mississippi, Alabama, Georgia, Florida, North Carolina, South Carolina, Virginia, Delaware, Maryland, New Jersey, New York, and Connecticut.

Status in the United States

From Madsen et al. (1998):

“American frogbit (*Limnobium spongia* (Bosc) Steudel) is a native aquatic monocot found in the southern United States through Texas and up the eastern, coastal states to New Jersey (Gleason and Cronquist 1991).”

From NatureServe (2021):

“Widespread and often weedy aquatic plant in its native range in the eastern United States, reportedly very abundant in some areas of central Florida. Quite rare, and perhaps repeatedly introduced but nonpersisting [sic], in the northern portion of its range (e.g., New York and Connecticut), and some states in central part of range (e.g., North Carolina).”

From Les and Capers (1999):

“Two disjunct, northern populations of *Limnobium spongia* are known from New York state (Monroe and Yates Counties) and there is one unverified record from Lake Co., Indiana (Catling and Dore 1982; Cook and Urmi-König 1983).”

“The Connecticut population of *Limnobium spongia* consisted only of a few small, emergent plants which were rooted in moist sand along the shore of an access site to the pond. [...] As expected, a survey of the site on May 3, 1999, failed to detect any surviving plants. A larger disjunct northern population discovered in Monroe Co., New York, in 1828 had disappeared from that site by 1895 (House 1924). Mitchell and Tucker (1997) categorized *L. spongia* as a nonpersisting [sic] introduction in New York.”

According to USGS (2021), nonindigenous occurrences of *Limnobium spongia* have been reported in the following States (years reported, watersheds, and population status in parentheses):

- Connecticut (1998; Shetucket; extirpated)
- New York (1828–2014; Irondequoit-Ninemile and Lake Ontario; failed)

From California Department of Food and Agriculture (2015):

“It has been determined that the following species of plants are noxious weeds within the meaning of Section 5004 of the Food and Agricultural Code: [...]

Limnobium spongia (American spongeplant, American frog's-bit)”

This species is in trade in the United States as an ornamental plant. According to The Pond Outlet (2021), *Limnobium spongia* is available for sale for \$4.32. The Pond Outlet is a retailer based in Los Angeles, California.

Means of Introductions in the United States

From Les and Capers (1999):

“The sources of disjunct populations of *Limnobium* in Connecticut and elsewhere in the northern United States are uncertain but they are unlikely due to escapes from cultivation. Although *Limnobium* has been recommended as an aquarium and water garden plant since the turn of the century (Bisset 1907; Tricker 1897), the early New York record substantially predates the popularity of water plant cultivation in the United States. The Connecticut site has no history or association with water plant cultivation.”

“Lowden (1992) concluded that dispersal of *Limnobium* in United States has occurred by natural agents and not by introductions. The immature condition of the Connecticut plants led us to conclude that *Limnobium* was dispersed to this site by waterfowl.”

According to USGS (2021), possible introduction pathways for former introduced populations in Connecticut and New York are “planted ornamental” and “escaped captivity.”

Remarks

Some sources treat *Limnobium spongia* and *Limnobium laevigatum* as being synonymous. There is conflicting information available for both species. According to Cal-IPC (2021), The California Invasive Plant Council lists them as synonymous. They state that the species was introduced to the United States via California from Central and South America. However, according to ITIS (2021) and World Flora Online (2021), *L. spongia* is a distinct species that it is native to the southeastern United States. This assessment follows World Flora Online in treating *L. spongia* as a distinct species and excludes introduced populations of the congener *L. laevigatum* in California that have been attributed to *L. spongia* by some sources.

From Les and Capers (1999):

“Cook and Urmi-König (1983) recognized two New World *Limnobium* species, *L. spongia* and *L. laevigatum*; whereas, Lowden (1992) treated these taxa as morphologically distinct, allopatric subspecies of *L. spongia*. *Limnobium laevigatum* (= *L. spongia* subsp. *laevigatum*) is restricted in its distribution to Mexico, South America, and the Caribbean archipelago (Lowden 1992).”

From Jepson Flora Project (2021):

“Correspondence 3 indicates that, according to Dean Kelch (pers. comm. to Baldwin), Fred Hrusa has determined that relevant California material belongs to *Limnobium laevigatum* (Humb. & Bonpl. ex Willd.) Heine and not *Limnobium spongia* (Bosc) Rich. ex Steud., and that the latter name has therefore been misapplied in California [there is one record in CCH [Consortium of California Herbaria] labeled *Limnobium spongia*, but it is from material grown in a greenhouse in CA], a situation opposite that presented in The Jepson Manual [Ed. 2].”

According to USDA (2021), Kentucky lists *L. spongia* as “threatened” and Maryland lists it as “endangered.”

According to ITIS (2021), *L. spongia* is also known by common name Frogbit.

Information for this assessment was searched for using the valid name *Limnobium spongia* and the synonyms *Hydrocharis cordifolia*, *H. spongia*, *Limnobium boscii*, and *Rhizakenia ovata* (World Flora Online 2021).

2 Biology and Ecology

Taxonomic Hierarchy and Taxonomic Standing

According to World Flora Online (2021), *Limnobium spongia* is the current accepted name for this species.

From ITIS (2021):

Kingdom Plantae
Subkingdom Viridiplantae
Infrakingdom Streptophyta
Superdivision Embryophyta
Division Tracheophyta
Subdivision Spermatophytina
Class Magnoliopsida
Superorder Lilianae
Order Alismatales
Family Hydrocharitaceae
Genus *Limnobium*
Species *Limnobium spongia* (Bosc) Rich. ex Steud.

Size, Weight, and Age Range

From Illinois Wild Flowers (2021):

“This perennial herbaceous plant consists of a loose rosette of basal leaves. [...] The mature blades of these leaves are 1-3" (2.5-7.5 cm.) long and nearly as much across; [...] The petioles are 1½-6" (4-15 cm.) long; they are longer on terrestrial or emergent leaves than floating leaves. [...] Both staminate (male) and pistillate (female) flowers are about 1" (2.5 cm.) across, [...] The pedicels of staminate flowers are 1½-4" (4-10 cm.) long, while the pedicels of pistillate flowers are ¾-1½" (2-4 cm.) long.”

“These fruits are about ¼-½" (0.5-1.2 cm.) across at maturity; [...] In the northern part of its range (including southern Illinois), the Sponge Plant (*Limnobium spongia*) overwinters as dormant turions (starchy winter buds) that sink below the surface of the water, while in warmer climates it can grow throughout the year.”

Environment

From Illinois Wild Flowers (2021):

“Habitats include swamps, the water of lakes and ponds, muddy borders of lakes and ponds, and deep ditches. In southern Illinois, the Sponge Plant can be found in Bald Cypress swamps. It can be found in both high quality and disturbed wetlands (usually the former in Illinois).”

“The preference is full or partial sun and wet conditions. The Sponge Plant (*Limnobium spongia*) can float on water or root itself in mud; it does not like to dry out. The water should be stagnant or very slow-moving.”

Climate

From Illinois Wild Flowers (2021):

The Sponge Plant can spread aggressively in warm climates by means of its stolons; this is less of a problem in climates with winter temperatures that are substantially below-freezing. This plant can be cultivated indoors in either an aquarium or wet terrarium.”

Distribution Outside the United States

Native

The native range of *Limnobium spongia* is entirely within the United States, see Native Range in Section 1.

Introduced

No records of introductions outside the United States were found for *Limnobium spongia*.

Means of Introduction Outside the United States

No records of introductions outside the United States were found for *Limnobium spongia*.

Short Description

From World Flora Online (2021):

“Herbs, to 50 cm. Roots branched; stolon buds with 10 or more roots. Leaves floating or emersed in dense vegetation and when stranded; blade 1--10 ' 0.9--7.8 cm; primary veins forming 30--80° angle with midvein, ascending, aerenchyma extensive, nearly margin to margin, individual aerenchyma space (located ca. 1 mm from either side of midvein) , 0.4--1.6 mm wide, 1 mm from midvein across its longest axis. Flowers: staminate flowers with 9--12(--18) stamens; pistillate flowers with 3--4 petals; ovary 6--9-carpellate, locules 6--9; styles 2-fid nearly to base; ovules 200. Fruits 4--12 mm diam.”

“Lf-blades broadly ovate (especially when emergent) to deeply cordate-orbicular but usually acute, 3--7 cm long and wide, 5--7-veined, the lateral veins arcuate- ascending; floating lvs aerenchymatous [air-filled cavities] and spongy toward the base beneath; pedicels 3--10 cm; pet

white, linear or linear-oblong, ca 1 cm, not much longer than the slender sep; anthers elongate, ca 3.5 mm; stigmas conspicuous, 10–15 mm; fr 4–12 mm thick.”

Biology

From Illinois Wild Flowers (2021):

“The sponge plant is dioecious or monoecious (usually the former);”

“Information about floral-faunal relationships for this species is relatively limited. The somewhat succulent leaves of Sponge Plant (*Limnobium spongia*) are eaten by the Slider (*Trachemys scripta*) and other turtles (Ernst et al., 1994), while its fruits and seeds are eaten by such waterfowl as the Golden Eye, Green-Winged Teal, Mallard, Old Squaw, Northern Pintail, Ring-Necked Duck, and Wood Duck (Les & Mehrhoff, 1999; observed in southern New England). The gelatinous spiny seeds can stick to the feathers or feet of waterfowl and conveyed from one wetland to another, thereby distributing the seeds to new locations. Similarly, watercraft may spread the seeds to new wetland locations using the same method.”

From Madsen et al. (1998):

“It exhibits two growth habits, a rooted emergent form and a free-floating rosette form (Tarver et al. 1988) [...] Although a native plant, American frogbit can produce extensive floating mats and create nuisance situations, such as blocking navigation, affecting water quality, fish and wildlife habitat, and recreational usage.”

Human Uses

From Gettys (2019):

“In addition to forming nuisance-level populations in its historic range, frog’s bit is also expanding its range, with new introductions most likely due to seed transportation by ducks and other waterfowl and possibly escape from cultivation, because the species is sold as an aquarium plant (Anderson, 2011; Les and Mehrhoff, 1999).”

From Les and Mehrhoff (1999):

“Its availability as a water garden and aquarium plant is generally limited, [...]”

Diseases

From Illinois Wild Flowers (2021):

“A fungal disease, *Cercospora limnobia*, can cause brown lesions to develop on the leaf blades.”

Threat to Humans

From Madsen et al. (1998):

“Although a native plant, American frogbit can produce extensive floating mats and create nuisance situations, such as blocking navigation, affecting water quality, fish and wildlife habitat, and recreational usage.”

From Gettys (2019):

“The floating aquatic species frog’s bit (also called american [sic] spongeplant) has a growth habit similar to that of water hyacinth. Although frog’s bit is indigenous to North America, it routinely forms populations large enough to require management efforts (Les and Capers, 1999). For example, Bodle (1986) reported that frog’s bit can have “water hyacinth-like growth”; as a result, the species is targeted for management in some aquatic ecosystems where it is native, including the often-invaded St. Johns River (Knight, 1985). The Florida Fish and Wildlife Conservation Commission (FWC), which is the state agency responsible for coordinating plant management in most of Florida’s public waters, treated more than 900 acres of frog’s bit between 2013 and 2018 (Florida Fish and Wildlife Conservation Commission, 2014, 2015, 2016, 2017, 2018).”

3 Impacts of Introductions

There are records of introductions for *Limnobium spongia* in Connecticut and New York. However, there are no documented impacts of introductions from these failed populations and it is uncertain if these introductions were the result of natural dispersal via waterfowl or anthropomorphic pathways.

From California Department of Food and Agriculture (2015):

“It has been determined that the following species of plants are noxious weeds within the meaning of Section 5004 of the Food and Agricultural Code: [...]

Limnobium spongia (American spongeplant, American frog's-bit)”

4 History of Invasiveness

There are records of introductions for *Limnobium spongia* beyond its native range in Connecticut and New York. These introductions have not resulted in established populations. It is uncertain how these introductions occurred. Some researchers have suggested they may have been the result of natural dispersal with seeds being transported by waterfowl, as opposed to other anthropomorphic pathways. *L. spongia* is in trade as an ornamental plant but specifics regarding quantity and duration of trade were not available. The history of invasiveness is classified as No Known Nonnative Population.

5 Global Distribution



Figure 1. Known global distribution of *Limnobium spongia*. Observations are primarily reported from the eastern United States, but also from Hawaii, Washington, California, Mexico and South America. Map from GBIF Secretariat (2021). Occurrences in Washington, California, Hawaii, Mexico and South America were not included in the climate matching analysis as they are not known to represent establish populations of *L. spongia* and may be occurrences of *L. laevigatum*. Occurrences in northern Illinois, New York, and Connecticut were also excluded from the climate matching analysis as these locations represent known failed populations of *L. spongia* (New York and Connecticut), or a location where an established population could not be corroborated (northern Illinois).

6 Distribution Within the United States

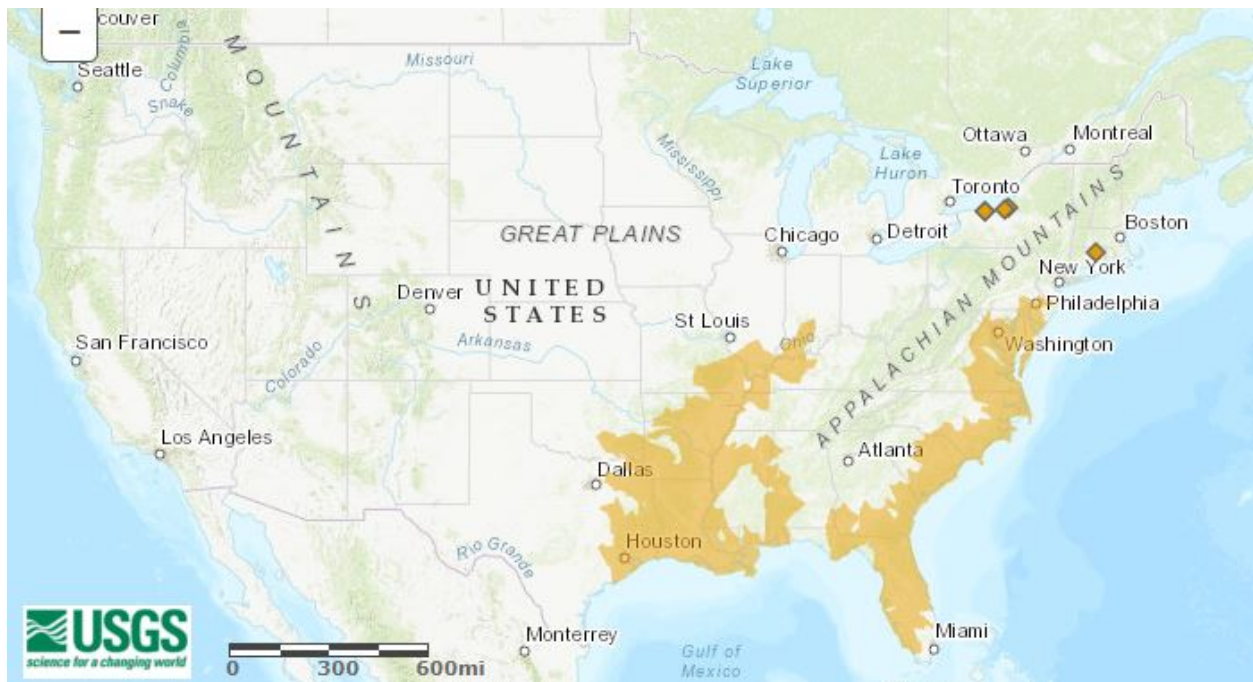


Figure 2. Known distribution of *Limnobium spongia* within the United States. Map from USGS (2021). Native distribution is indicated by orange shading. Nonindigenous occurrences (diamonds) in New York and Connecticut were excluded from the climate matching analysis because they represent known failed populations of *L. spongia*.

7 Climate Matching

Summary of Climate Matching Analysis

The climate match for *Limnobium spongia* was generally high for the eastern portion of the contiguous United States and low for the western portion. High matches were found throughout virtually the entire Southeast, southeastern Midwest, and MidAtlantic. This includes the areas where *L. spongia* is native. Medium matches were found in parts of the Northeast and upper Midwest south into eastern Texas, while a low match was found from the middle Great Plains westward. The overall Climate 6 score (Sanders et al. 2018; 16 climate variables; Euclidean distance) was 0.34, high (scores greater than or equal to 0.103, are classified as high). Alabama, Arkansas, Connecticut, Delaware, Florida, Georgia, Iowa, Illinois, Kansas, Kentucky, Louisiana, Massachusetts, Maryland, Michigan, Missouri, Mississippi, North Carolina, New Hampshire, New Jersey, New York, Ohio, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, Vermont, and West Virginia had high individual Climate 6 scores. The remaining States had low individual Climate 6 scores. No States had medium individual Climate 6 scores.

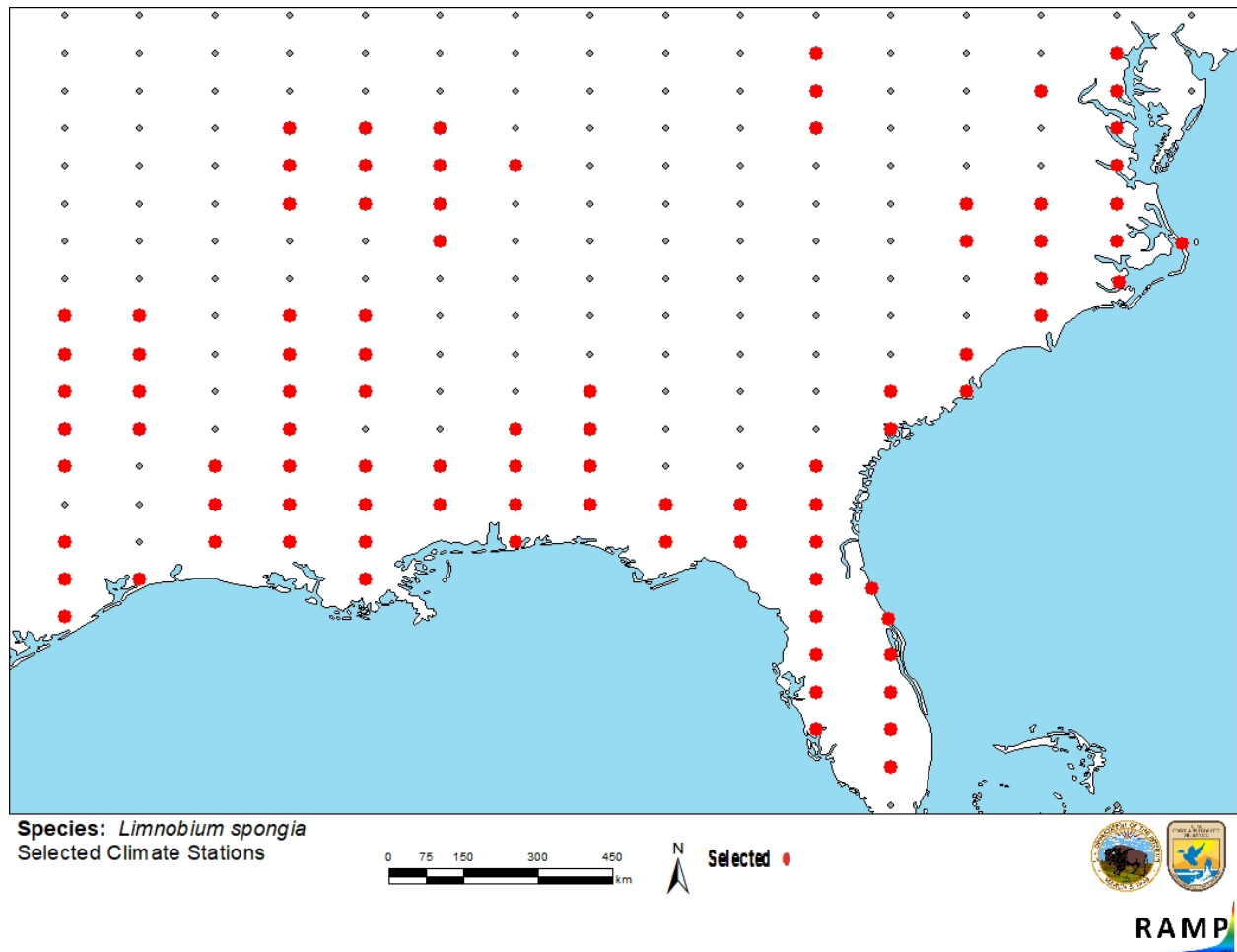


Figure 3. RAMP (Sanders et al. 2018) source map showing weather stations in southeastern North America selected as source locations (red; United States) and non-source locations (gray) for *Limnobium spongia* climate matching. Source locations from GBIF Secretariat (2021). Selected source locations are within 100 km of one or more species occurrences, and do not necessarily represent the locations of occurrences themselves.

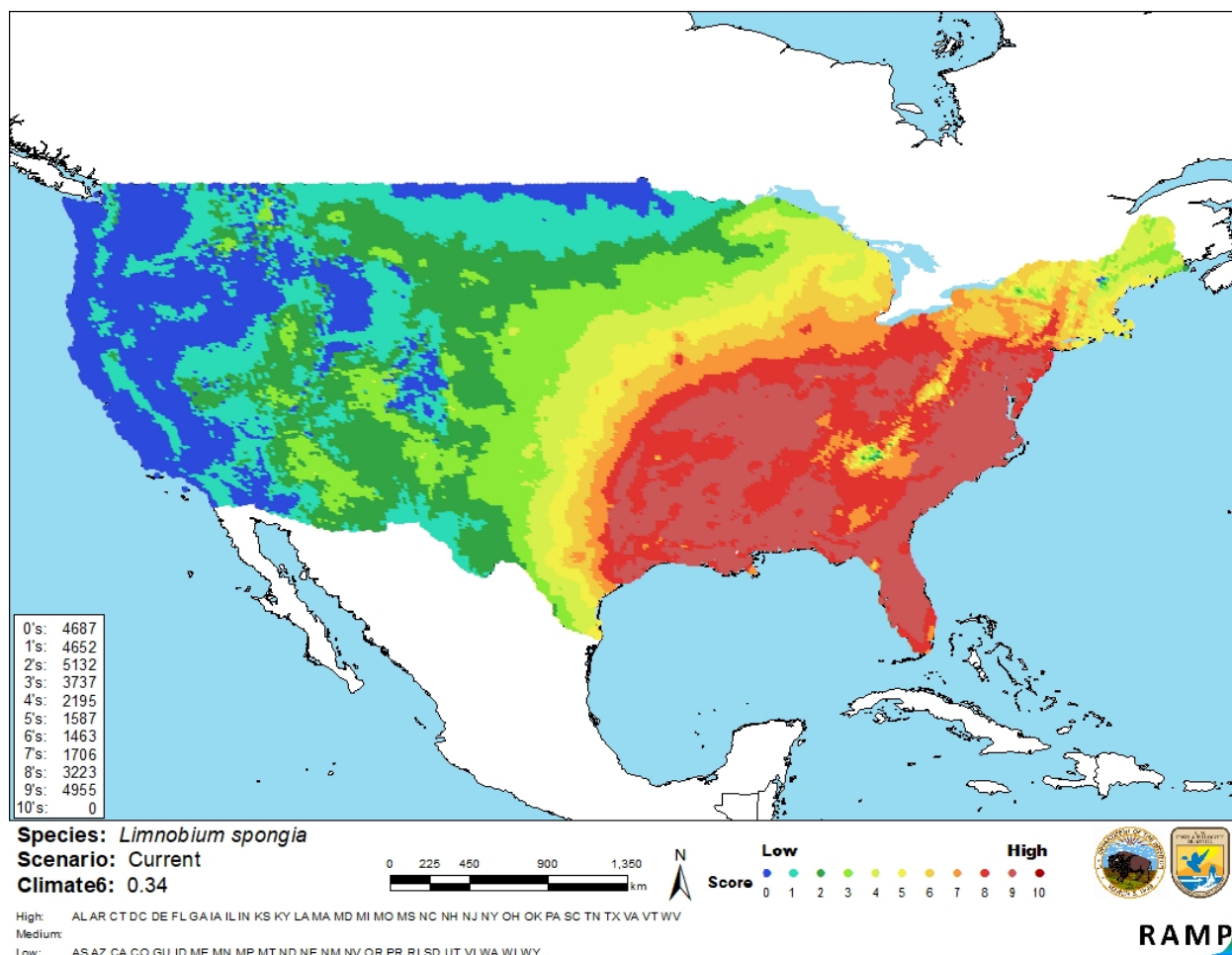


Figure 4. Map of RAMP (Sanders et al. 2018) climate matches for *Limnobium spongia* in the contiguous United States based on source locations reported by GBIF Secretariat (2021). Counts of climate match scores are tabulated on the left. 0/Blue = Lowest match, 10/Red = Highest match.

The High, Medium, and Low Climate match Categories are based on the following table:

Climate 6: (Count of target points with climate scores 6-10)/ (Count of all target points)	Overall Climate Match Category
$0.000 \leq X \leq 0.005$	Low
$0.005 < X < 0.103$	Medium
≥ 0.103	High

8 Certainty of Assessment

The certainty of assessment for *Limnobium spongia* is low. There is information available about the biology and ecology of this species. However, uncertain and conflicting information was found regarding this species' native range, and taxonomic standing. Some sources have attributed introduced populations of *L. laevigatum* to *L. spongia* which has resulted in conflated

information for the two species, particularly information regarding the distribution and potential impacts of introductions of *Limnobiium* spp. in the United States. *L. spongia* is in trade as an ornamental plant but specifics regarding quantity and duration of trade were not found.

9 Risk Assessment

Summary of Risk to the Contiguous United States

American Spongeplant, *Limnobiium spongia*, is an aquatic plant that is native to the southeastern United States. It is sometimes a nuisance species within the native range. Kentucky lists the species as threatened and Maryland lists it as endangered. Although some sources report introductions of *L. spongia* to Connecticut and New York, these disjunctive populations failed to establish, and it is uncertain if they were the result of natural dispersal or anthropomorphic introductions. *L. spongia* is in trade as an ornamental plant. *L. spongia* is listed as a noxious weed in California. The history of invasiveness is classified as No Known Nonnative Population. The overall Climate 6 score for the contiguous United States was high, with high matches found throughout the Southeast where it is native, southeastern Midwest, and MidAtlantic regions. The certainty of assessment is low due to uncertain and conflicting information regarding this species' native and introduced range and taxonomic standing. Conflicting information is largely the result of some sources attributing introduced populations in California of the congener *L. laevigatum* to *L. spongia*. However, most sources treat the two as distinct species. The overall risk assessment category is Uncertain.

Assessment Elements

- **History of Invasiveness (Sec. 4): No Known Nonnative Population**
- **Overall Climate Match Category (Sec. 7): High**
- **Certainty of Assessment (Sec. 8): Low**
- **Remarks/Important additional information:** Closely resembles *Limnobiium laevigatum* which is considered a synonym by some sources.
- **Overall Risk Assessment Category: Uncertain**

10 Literature Cited

Note: The following references were accessed for this ERSS. References cited within quoted text but not accessed are included below in Section 11.

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11 Literature Cited in Quoted Material

Note: The following references are cited within quoted text within this ERSS, but were not accessed for its preparation. They are included here to provide the reader with more information.

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